Results: The body mass index (BMI) in this population was normally distributed around a mean of 32.1 kg/m2. The prevalence of foot pain was 55.1%. There was a positive association between BMI and foot pain (odds ratio (OR) 1.12, 95% CI 1.06, 1.17). Foot pain was also positively associated with fat mass (OR 1.05, 95% CI 1.02, 1.08) and fat mass index (FMI) (OR1.16, 95% CI 1.06, 1.28) adjusted for age, gender, strenuous physical activity, and skeletal muscle mass or fat-free mass index (FFMI) respectively. When examining fat distribution, positive associations were observed for android/total body fat ratio (OR 1.40, 95% CI 1.08, 1.81) and android/gynoid fat ratio (OR 28.18, 95% CI 2.04, 389.70), though gynoid/total body fat ratio was inversely related to foot pain (OR 0.83, 95% CI 0.74, 0.94). Skeletal muscle mass and FFMI were not associated with foot pain when adjusted for fat mass or FMI respectively.
Conclusions: Increasing BMI, specifically android fat mass, is strongly associated with foot pain and disability. This may imply both biomechanical and metabolic mechanisms.

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EVALUATION OF SHOULDER PERIARTICULAR TISSUES IN PATIENTS WITH OSTEOARTHRITIS USING THE TENDON INDEX OF THE SHOULDER JOINT

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Purpose: To determine the feasibility of using the tendon index of the shoulder joint to assess the destruction of periarticular tissues of the shoulder joint in patients with osteoarthritis
Methods: The study involved 20 patients with osteoarthritis complained of pain in the shoulder joint. To assess pain were used VAS in quiescent state, in motion, and palpation. Assessment of the shoulder joint was carried out on the Constant Score. To evaluate the objective status used the tendon index of the shoulder joint, which included assessment of pain on a scale (0–3) during movements, causing the tension of the rotator cuff tendons (rotator cuff) and the long head biceps (Long head of the biceps tendon). Statistical data was carried out using Spearman's test.
Results: there was a marked correlation between the tendon index of the shoulder joint and VAS after palpation (r = 0.4), between the tendon index of the shoulder joint and VAS after joint motion (r = 0.3) as well as between the tendon index of the shoulder joint and the Constant Score (r = −0.6).
Conclusions: The tendon index of the shoulder joint can be used to assess the pathology of periarticular tissues of the shoulder joint in patients with osteoarthritis.

Table: Correlation between the tendon index of the joint and VAS and Constant Score

	VAS after palpation	VAS after joint motion	Constant Score
Tendon index of the shoulder joint	r = 0.4, p < 0.05	r = 0.3, p < 0.05	r = −0.6, p < 0.05

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EARLY LEARNING EXPERIENCE WITH A NECK STABILIZED THA STEM FOR TREATING OSTEOARTHRITIS

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Purpose: Total hip arthroplasty is one of the most effective orthopaedic procedures with a very high success rate as measured by pain relief, improved function and patient satisfaction. However, since the introduction of total hip arthroplasty in the 1940s, a range of design philosophies for femoral components have demonstrated variable clinical results. Aseptic loosening, joint dislocation, thigh pain, bone resorption and femoral component failure have been some of the complications that plague this procedure. The past few years has seen an influx of so-called short stems with very little clarification as to design features, required surgical technique and long-term clinical outcomes. Most devices, meet with some level of learning curve and most systems do little in the way of warning new surgeons as to the pearls and pitfalls during the initial surgical phase. This paper is designed to review the lessons learned with a new neck stabilized implant stem during the first year of surgical experience.
Methods: Three surgeons at different centers implanted 200 stems. Two surgeons used the anterior single incision and one surgeon used a small posterior surgical approach. All stems were of a novel modular neck stabilized stem design concept. All were implanted with cementless acetabular components of four different designs and three different bearing surfaces. Intraoperative x-rays were taken on all patients undergoing the posterior approach and half of all anterior approach patients had intraoperative fluoroscopy or plain x-rays taken.
FEA studies were evaluated to determine best stem orientation and instrumentation designed and developed for surgical preparation of femoral stem.
Results: One stem has been revised due to sepsis and no stems have been revised due to aseptic loosening. One modular neck was adjusted due mechanical impingement with the acetabular component.
Surgical evaluation clearly demonstrates that there is no difficulty for access to the socket or proximal femur in utilizing a neck sparing stem design.
Radiographic review demonstrates 20° of internal rotation is needed for proper measurement of femoral offset and medial neck curve.
Intraoperative evaluation demonstrated the need for a smaller stem size in small profile female patients.
Surgical technique demonstrated three unique learning aspects of utilization of a curved small neck stabilized stem design. One: level of neck resection. Two: angle of neck resection. Three: rasping not broaching the proximal medial curve.
Conclusion: The initial first year results of a novel modular neck stabilized curved stem design clearly demonstrates that this approach can be used as a main stream treatment for the osteoarthritic patient.
The advantage of neck sparing stabilized stems saves tissue, both hard (bone) and soft tissue as compared to conventional cementless total hip stem designs. This new approach has the potential benefit of less blood loss, quicker rehabilitation and if necessary easier removal and restoration of revision surgery. We are encouraged with our initial clinical/surgical impression and believe the potential advantages warrant further evaluation of this new approach to THA.

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BONE MINERAL DENSITY IS CROSS SECTIONALLY ASSOCIATED WITH CARTILAGE VOLUME IN HEALTHY, ASYMPTOMATIC ADULT FEMALES: GEELONG OSTEOPOROSIS STUDY

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Purpose: The association between osteoporosis and osteoarthritis is controversial. Whilst previous studies have shown an association between bone mineral density (BMD) and cartilage volume to be positively associated, and some data exist of the relationship between local BMD and knee structures, the association between distant site-specific measures of BMD and other knee structures is unknown. The aim of this study was to determine the associations between BMD at

eight skeletal sites and knee structure in asymptomatic young to middle-aged females without any clinical signs of osteoarthritis.
Methods: One hundred and sixty healthy, females (29–50yr) without symptoms of osteoarthritis underwent magnetic resonance imaging of the knee. BMD was measured at the spine, hip, total body and forearm by dual energy x-ray absorptiometry, and SoS, BUA and SI were measured at the calcaneus by quantitative ultrasound (QUS). BMD and QUS measures were tested for an association with cartilage volume, defects, and bone marrow lesions (BMLs).
Results: medial cartilage volume was positively associated with bmd at the total body, femoral neck, and ward's triangle (all $p < 0.05$). Non-significant associations in the same direction existed at the spine ($p = 0.07$), and trochanter ($p = 0.10$). Findings in the lateral compartment were similar. The presence of medial cartilage defects showed a non-significant association with bmd at the spine ($p = 0.05$). Bmd was not associated with lateral cartilage defects or bmls. No associations were observed with qus measures at the calcaneus.
Conclusions: Whilst site-specific BMD is associated with cartilage volume at the knee in asymptomatic females aged 29–50yr, peripheral BMD measures, and QUS measures of the calcaneus, showed no associations with knee structure. These data suggest that the association between cartilage volume and axial/ lower limb BMD may relate to common local, possibly biomechanical, factors.

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COMPARISON OF TWO HYALURONIC ACID FORMULATIONS ON FUNCTIONAL OUTCOMES IN PATIENTS WITH KNEE OSTEOARTHRITIS

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Purpose: Intra-articular hyaluronic acid (HA) injections are a non-surgical palliative treatment for knee osteoarthritis (OA) that have the potential to reduce pain and improve functional ability. However, not all patients that receive HA injections have a beneficial response. Several different HA formulations are available and a comparative analysis of outcomes is lacking in the literature. The purpose of this study was to quantify the functional benefit of two different HA formulations for individuals with knee OA.
Methods: The Knee Outcome Survey (KOS) of 378 patients who received HA injections for knee OA were retrospectively analyzed. Baseline scores prior to injection and scores 4–6 weeks after the first injection were compared between subjects who received 4 Supartz injections ($n = 220$) or a single Synvisc-One injection ($n = 158$). Responders to the HA injections were operationally defined by two methods: 1) individuals who had a KOS change score greater than 11 points, the minimally detectable difference for the KOS, or 2) patients who showed any magnitude increase in KOS scores. Self-reported knee function, ranked as "Severely Abnormal", "Abnormal", or "Nearly Normal", was evaluated at baseline. Change in pain (0–5 scale) was compared between injection types and between groups created based on the self-reported knee function at baseline. A repeated measures ANOVA was used to assess change in KOS score between injection types. Chi-square analysis was used to determine differences in the responder rate between injection types and determine if there was a relationship between change in pain and injection type or between change in pain and baseline self-reported knee function.
Results: There was a significant improvement of 5.77 (SD 13.83) points in KOS scores between baseline and follow-up ($p < 0.001$), although no difference was found in KOS change scores between Supartz or Synvisc-One HA injections ($p = 0.95$). 45% of individuals reported decreased pain at follow-up ($p < 0.001$), with no difference between injection types ($p = 0.23$). The ratio of responders to non-responders was 28/72 based on the 11 point KOS change criterion and 66/34 based on any change in KOS criterion. There was no difference in response rate between Supartz and Synvisc-One based on the 11-point change ($p = 0.73$) or any change ($p = 0.83$) in KOS scores. At baseline, 18, 122, and 237 patients classified their knee function as Severely Abnormal, Abnormal, or Nearly Normal, respectively. There was a significant relationship between baseline self-reported functional score and change in KOS score ($p < 0.001$) (Figure 1) and responder rate using the 11 point change in KOS score criterion ($p < 0.001$), with lower functional report at baseline corresponding to an increased likelihood of improvement at follow-up. The relationship between baseline self-reported functional score was not significantly related to the change in pain ($p = 0.07$) or responder rate using any change in KOS score criterion ($p = 0.21$).

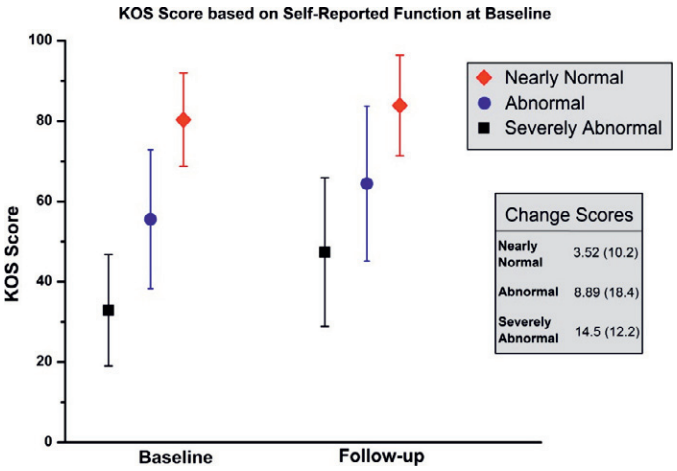

Fig. 1.

Conclusions: Both HA formulations resulted in significant, but relatively small, improvements in KOS scores and pain. Patients who report their knee function as worse at baseline have the greatest likelihood of larger improvements in KOS scores and a tendency for greater reduction in pain. This trend may be a characteristic of the ceiling effect in the metrics used to analyze post-injection outcomes and future work should assess other variables that may provide information on which subsets of patients will have an optimal response. HA injections provide pain relief and reduce disability in nearly 2/3 of patients and there was no apparent functional benefit to the single versus multi-dose regimens. Patients with a wide degree of disability at baseline benefit from HA injections, but patients who are more disabled may experience a greater functional improvement with this treatment. Funding for this study was provided by NIH grant P20RR01645

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CORRELATION BETWEEN RADIOGRAPHIC FINDINGS, SF-36 AND WOMAC SCORES FOR EVALUATION OF KNEE OSTEOARTHRITIS

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Purpose: Criteria that define disease severity in osteoarthritis (OA) are essential for diagnosis and the evaluation of different treatment interventions. At present, these evaluations rely mostly on radiographic evaluation and subjective self-reported surveys. The validity of these clinical tools, however, is loose. The purpose of the current study was to evaluate the correlations between common clinical OA diagnostic tools in order to determine the value of each. A secondary goal was to investigate the influence of gender differences on the findings.
Methods: 518 patients with medial compartment knee OA were evaluated using the Western Ontario and McMaster Osteoarthritis Index (WOMAC) questionnaire, SF-36 Health Survey and plain radiographs. A correlation analysis was performed between the different domains of each and the radiographic scale.
Results: A significant correlation was found between WOMAC pain, stiffness and function scores and all SF-36 domains. Functional and physical items were better correlated than mental, emotional and stiffness items. In addition, significant gender differences were found in all domains tested. Poor correlations were found between the radiographic severity of the disease and the domains of the clinical surveys.
Conclusions: Radiographs are unreliable in determining symptomatic severity of disease in knee OA, as they correlate poorly with pain and function. While all domains of the SF-36 and WOMAC questionnaires are correlated, functional and physical items of the questionnaires are in greatest agreement. This may suggest that these domains provide the most superior assessment of symptomatic knee OA.